

The United States Environmental Protection Agency (EPA) has allocated technical assistance funds to develop and implement stormwater best management practice (BMP) retrofit designs in Barnstable and Chatham, Massachusetts. The EPA-funded project is part of the newly-launched Southeast New England Coastal Watershed Restoration Program and is a demonstration and education and outreach project designed to promote the use of innovative stormwater BMPs by municipalities on Cape Cod. The project is intended to increase practitioner awareness and acceptance of green infrastructure (GI) as an effective stormwater management approach for treating and controlling nutrient pollution. Nitrogen, the principal nutrient of concern on the Cape, is a significant pollutant contributing to nitrogen impairments in several Cape embayments.

An overriding project goal is to enhance local partnerships under the Clean Water Act section 208 plan update and the implementation of nitrogen TMDLs established for Cape Cod watersheds. EPA anticipates that this project will be a transferable model to help solve water quality problems in developed areas of the Cape Cod and other New England watersheds (e.g., Long Island Sound; Great Bay, NH) and that it will also encourage communities to think about stormwater management and (GI) as a viable and cost-effective tool to improve water quality, increase recreational opportunities, reduce flooding, and create potential assets and amenities for revitalizing communities and building more livable neighborhoods.

In late summer of 2014, EPA working with the Cape Cod Commission and the MassDEP, solicited proposals for BMP projects from Cape Cod communities that drained to Nantucket Sound. An initial assessment of these BMP project proposals was made by the USEPA. Numerous candidate BMP sites were reviewed and many were deemed infeasible for a variety of reasons including geographical constraints and access limitations. Two locations; one draining to the Hyannis Inner Harbor in Barnstable and a second draining to Oyster Pond in Chatham, were selected for additional investigation. Total Maximum Daily Loads for Nitrogen have been developed or are under development for both of the locus watersheds. In each case, the receiving water bodies have been found to be impaired due to nitrogen discharges, of which substantial components are attributable to stormwater.

EPA's contractors, WaterVision LLC and Comprehensive Environmental Inc. (CEI), are currently in the process of designing and constructing the two demonstration nitrogen-removal stormwater BMP retrofits. Surface and subsurface gravel wetland systems are-were-have been selected as the most appropriate stormwater BMP designs to meet project objectives. Gravel wetland systems achieve nitrogen treatment and removal using an initial aerobic stage for nitrification and an anaerobic stage for reduction of nitrogen to elemental nitrogen gas. The UNH Stormwater Center has conducted research on the performance of several gravel wetland

system designs. EPA and the WaterVision team are coordinating with the UNH Stormwater Center throughout the Cape Cod BMP retrofit design process.

Preliminary conceptual designs have been developed for each of the proposed sites. The drainage area to the Inner Hyannis Harbor site is 8.4 acres. The proposed site itself covers an area of approximately ¼-acre located along a brick path in a relatively congested urban area. The site is notable in the interest expressed by Barnstable officials in accommodating this BMP retrofit and the overall excellent public visibility for stormwater education and outreach afforded by its urban setting. ~~The A preliminary conceptual design is in the process of being developed with consultation with the USEPA. It is presently envisioned that for~~ the site ~~will~~ consists of diverting an approximate 0.3 inch water quality volume (WQV) from an existing 24 inch municipal separate storm sewer (MS4) trunk line into two parallel wetland chambers. The first aerobic chamber will be above ground and convey water to the north (away from the MS4 diversion). The second, anaerobic chamber will be below ground and convey water to the south (back to the MS4). ~~Water will be diverted from an existing trunk line and treated water will be returned to the same line. Ok, i see . . . i incorporated the same info above . . .~~

The Oyster Pond, Chatham site is advantageous in being larger than the proposed Barnstable site (18.3 acre drainage area [Bruce, this is the # i have]) and capable of treating a larger water volume. The preliminary conceptual design at this location is a conventional gravel wetland system. The proposed design which would treat a 0.3 inch WQV incorporates a forebay and two gravel wetland chambers. The first aerobic chamber would receive stormwater proposed to be diverted from a n MS4 -stormwater trunk line in the nearby street. The aerobic chamber would discharge to an anaerobic chamber. The surface gravel wetland BMP would then discharge into a stream that would convey water back to the MS4 for discharge to stormwater outfall in Oyster Pond Harbor via an outfall.

Construction is anticipated to proceed in spring / summer of 2015. The project also includes a monitoring program to quantify BMP system performance. Education and outreach components will likely include signage at the site, public events, informational brochures and other technical outreach materials.